Again, in reference to the mythologic process, his position is that in the function which gives rise to all mythological ideas we have a characteristic kind of apperception belonging to all naïve consciousness, and suitably designated by the name personifying apperception.

"Myth-making or personifying apperception is not to be regarded as a special form or even as a distinct sub-form of apperception. It is nothing but the natural inceptive stage of apperception in general."

There is nothing to complain of here, in this illuminating identification of primitive mythological impulse with primitive apperception, except the term "personifying." For the sociological amateur the term "personification," and its connotation to the effect that early man assigned a human personality, with sensations, feelings, and volitions, all human, to everything in nature, from the mammoth and the lion to the humblest insect, and not only this, but to all inanimate objects, all processes, from the sun and the moon to the sand on the sea-shore, from the thunder and lightning to the rustling of a leaf—this has been an intellectual fetish for too long. But unless the author's meaning has been misunderstood, it would seem that he has not reached the true explanation, simple as it is, of the facts which gave rise to this easy result of "mythology in science." We still need an exact demonstration by psychology of the mental habits of early man in the direction of animistic and personificational beliefs.

The content of the social mythological consciousness is huge. Wundt, we are glad to observe, emphasises the predominance of the motive of "luck" in *Märchen,* fable, and saga. Here the free mental activity connects with the economic basis of life, which, by the conditions of the work, is not brought forward to any great extent. The hypothesis of an original monotheism or crypto-monotheism is rejected. The complex origin of religion is fully discussed, and its development is traced to the present day. Popular Christianity as tritheism, Christianity as a religion of feeling and will in contrast to intellectualistic systems like Buddhism, are among the interesting side-issues which the author follows out.

The origin and function of art supply a peculiarly fruitful field for psychology. It is interesting to notice that from Aristotle onwards the criticism of this expression of mind has been in striking contrast to that of other expressions in its freedom from metaphysical prejudice. The theory of art has been studied more or less empirically from the beginning.

"Play," as Wundt remarks, following the well-established opinion, "is the mother of art." As a motor-expression of ideas art is in interesting connection with cult and custom. Like everything else, it has its historical and its psychical origin. Thus, the Greek drama has its historical origin in the religious play, its psychical origin in imitation and catharsis. Aristotle gives us both; we mention his explanation by way of directing attention to the modern development in psychology of his original idea. He would recognise in the present analysis of the play-impulse his own germ-idea in a complete differentiated form.

In the description of early forms of art, significant tendencies are well illustrated. Its momentary character and its frequent bondage to assimilation are interesting peculiarities. For instance, the double-formed objects of Egyptian and Assyrian art are equally prevalent in savagery. The curious tables made out of animals with flat backs; the decorative motive of the alligator in Chiriqui art; the Gorgon series in Greek sculpture, are well-chosen types.

The dramatic magical plays of the Central Australians deserve analysis. Is not also the theory of sexual selection still to be reckoned with in the origin of art?

These are but "requests for more" where so much is given. Science owes a debt to one of her greatest intellects for this application of his psychology to the concrete mental history of the world.

A. E. CRAWLEY.

THE RIDDLE OF OLD AGE.

The Problem of Age, Growth, and Death: a Study of Cytomorphosis. By Prof. Charles S. Minot. Pp. xxiii+280. (London: John Murray, 1908.) Price 6*s.* net.

FROM the time of Cicero, perhaps before, the problems of longevity and of the cause of old age have again and again been subjects of speculation. Not long ago, Metchnikoff, in his optimistic work, "The Nature of Man," ascribed old age to a poisoning by bacterial poisons developed as a result of fermentations occurring in the large intestine. The effect of this poisoning is to produce a weakening of various cells and tissues, which then become a prey to the scavenging cells of the body, the phagocytes.

Prof. Minot, in the work under review, develops another conception of the nature of "growing old." Although in old age a condition of atrophy is frequent, and various degenerations of cells and tissues are usually present, in particular of the arterial system, so that it has been said "a man is only as old as his arteries," Prof. Minot combats the view that old age is a kind of disease, and regards it as a necessary consequence of the changes in the cells of the body, which are inevitably progressive from birth to death; this succession of cellular changes is termed "cytomorphosis." In the development of his subject, the author first discusses the rate of growth in the embryo and in the young after birth. The rate of growth, very rapid at first, becomes slower and slower, and with the progress of growth various structural changes in the cells can be demonstrated to occur. These changes always progress, and ultimately end in degeneration and death, so that even at the period when the body is most vigorous, cellular death is of constant occurrence. The rate of growth is instructively illustrated by tables and curves of the height and weight of boys and girls, and of the weight of rabbits, guinea-pigs, and chicken at various age periods. It is shown that the greatest

percentage increase of weight after birth occurs in those animals which are born least mature. Thus in the guinea-pig, which is born in a relatively mature state, the daily percentage increment of weight just after birth is 5 per cent., while the rabbit, which is born much less mature than the guinea-pig, daily adds 17 per cent. to its weight. In embryonic life, cellular division and increase in weight are still more marked, and Prof. Minot estimates that 98 per cent. of the original growth power has been lost at birth, and the power of growth becomes less and less as age advances.

Differentiation and rejuvenation of cells are next considered. In the embryo the cells differ but little from one another; they do not display structural differentiation, whereby it could be said from what part of the embryonic body they were derived; while in the adult the microscopic characters of a cell generally suffice to determine its place of origin. Moreover, with the differentiation of cells with age, the protoplasm increases in amount relative to the nucleus. The conception is therefore reached that the growth and differentiation of the protoplasm and relative diminution of nuclear matter are the cause of the loss of the power of growth.

If cells suffer from old age as their protoplasm increases and becomes differentiated, a general and progressive process in the individual, there should be some mechanism for rejuvenation; this the author regards as accomplished by the segmentation of the ovum, during which process an *increase* of nuclear matter takes place at the expense of the protoplasm. The author believes that there is no satisfactory evidence that the progeny of old cells (other than of the ovum) can resume the primitive state and undergo re-differentiation. In cases in which regeneration of excised parts, &c., is effected in the individual, *e.g.* in planarians and ascidians, the regenerated part is always the product of undifferentiated cells, and is not derived by the growth of the old tissues.

The usual method of rejuvenation adopted by nature is by the separation of cells in the primitive and undifferentiated condition, and their isolation as the germ or sex cells. Age then represents the result of a progressive cytomorphosis of which death is the culmination. Longevity, the duration of life, depends, therefore, upon the rate of cytomorphosis, which varies much in different species, and perhaps in different individuals of the same species. Whether rejuvenation can be improved and senescence delayed are questions to which the author gives no definite answer, though he surmises that in the future it *may* be possible to increase the activity of nuclei and prolong the younger system of organisation. Death he regards as acquired during the process of evolution in consequence of cytomorphosis. As organisation becomes higher and higher, the need for differentiation becomes greater; this involves the end, and death is the price we have to pay for the differentiation which exists in us, and to which we owe our great array of faculties!

This, in brief, is the argument of Prof. Minot, which is presented in an attractive form with many appropriate illustrations, and we have perused this work with considerable interest. Finally, a suggestion of some importance is made. The author develops the conception that not only physical but also psychological development is most rapid in early life, and progressively declines as age advances. He suggests, therefore, that the tendency there is in some quarters to postpone the period of learning is wrong, and that as much use as possible should be made of the early years of life. R. T. H.

THE SONGS OF BIRDS.

Kunst und Vogelgesang in ihren wechselseitigen Beziehungen von naturwissenschaftlich-musikalischen Standpunkte beleuchtet. By Dr. B. Hoffmann. Pp. ix+230. (Leipzig: Quelle und Meyer, 1908.) Price 3.80 marks.

THIS is the most interesting book on the songs of birds that has appeared since the late Mr. C. A. Witchell published his "Evolution of Bird-song" in 1896, and it excels that work both in soundness of judgment and in knowledge of music. Its object, however, is not quite the same as that of Mr. Witchell's volume (which does not seem to have fallen into Dr. Hoffmann's hands); the latter was an attempt to trace the development of song from call- and alarm-notes, and also from imitation of natural sounds, while Dr. Hoffmann's work may be described as an essay on the relation between the music of birds and the music of art.

For dealing with this subject the writer is evidently well qualified; he is clearly a close observer of all sounds made by birds in their wild state, and wisely abstains from making use of the music of birds in captivity, and at the same time he is quite at home in the subtleties of the musical art. The result is that we have here no foolish attempt to represent the music of birds on our musical scale, except in a few cases where it is possible to do so as a means of illustrating certain points rather than as an exact reproduction of the notes of the singer. For Dr. Hoffmann is well aware that the great majority of singing birds do not use the intervals of our scale, though he is right in claiming that a few occasionally do so. So, too, in a very interesting section on rhythm in song, he denies that it is to be found in any sense in a great number of songs, while rightly asserting that it is present in those of certain species, such as quail, great tit (Kohlmeise), wood-pigeon, and song-thrush.

In another section (pp. 99–122) he asks the question how the bird comes by a sense of rhythm, and, rejecting Bücher's theory that rhythm in music can be traced to the movements of the body, he is disposed to think that in the case of birds it has its origin in the action of the heart; but this is a delicate question, for which the reader must be referred to the author's own statement of it. Dr. Hoffmann also discusses the question of "Metrik" in bird-song, *i.e.* Can the strains sung by any birds be divided into feet or bars? On p. 84 foll. he maintains that in the song of the nightingale, the most highly